anticipation rejections on excerpts which in fact do not support his assertions.

Vagnozzi teaches general techniques for storing and retrieving data on digital computers, and in particular to database indexing techniques used for document management. Only in a broad sense is the reference relevant to Applicant's invention.

Using Claim 1 as a disclosure illustrative of the Vagnozzi invention, Applicants list a number of distinctions that emphasize how the present invention differs in kind from Vagnozzi.

For example, Vagnozzi uses three levels of keys (coarse slice, fine slice, and record number), whereas Applicants use a single BitSet in any column to store BIGINT keys.

Vagnozzi associates BitVectors with each data value of attribute (For example Color: Blue and so on...). In the instant specification, Applicants use BitSets to model relationships between tables by using BitSets in columns that do not depend on any attribute data values from the tables.

Vagnozzi's invention relates to techniques used for document management with implicit use of BitVectors. Applicants' invention discloses techniques for relationship management with explicit queries that use BitSets. Vagnozzi does not mention any constraints on size of BitSets. Applicants allow constraints on the number of keys in the BitSet to allow database integrity thus disallowing incorrect relationship data from being entered into the database. Vagnozzi mentions the requirement of indexing. Applicants do not require any indexing.

Vagnozzi mentions hierarchical relationships to represent objects with a particular data value. Applicants disclose the technique of using scalar functions between columns [0062] and for modeling Categorization [0066] and retrieving entities associated with all levels with a single query [0074]. This is not dependent on any data values.

Applicants disclose the technique of using column functions for relationships [0057-0061] and Boolean Rule Evaluation [0076] using either iteration of recursive queries. Vagnozzi does not disclose Boolean Rule Evaluation.

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Applicants describe the use of BitSets in Enterprise Java Beans.[0063]; Vagnozzi does
not. Applicants describe the use of BitSets for confirmation of existence or count of
entities in the relationship [0055]. Vagnozzi does not.

As to claim 1, the Examiner asserts that Vagnozzi teaches: *"An*
article of manufacture comprising computer usable medium having computer readable program
code means embodied therein for causing a relationship to be implemented within a database
using BitSets, the computer readable program means in said article of manufacture comprising
computer readable program code means for causing a computer to effect (See paragraph [0139])

Vagnozzi provides a database indexing method where there is a need to create target keys for
slices and attribute data values. Applicants have associations stored in the form of BitSets.
Applicants have no dependency on attribute data values.

"defining a database scheme (See paragraph [0001-00101])" Vagnozzi mentions records with
fixed length [0036] and provides a mechanism for query processing that indexes the list of
records based on data values. Applicants have variable length BitSets and query processing does
not depend on data values. The BitSets are prepopulated based on associations.

"quantify a relationship among a plurality of entities (See paragraph [0005-0006], [0010-0011]
and [0014].

In [0005-0006] Vagnozzi mentions indexing using keys based on data values. In [0010-0011]
Vagnozzi associates data using an index structure for one or more data values for the attributes.

When using hierarchical relationships, in [0014] Vagnozzi mentions using indexes associated
with different attributes and each index associating data values. Applicants use BitSets based
on independent relationships, not data values.

"populate said database with instances of relationships among said entities and concurrently
populating said database with Bitsets, inserts, delets andlor changes (See paragraph [0006],
[0013-00141, [0036], [0062])

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In Paragraph [0006] Vagnozzi mentions using Bitmaps or BitVectors to identify records containing a particular item of data within a particular data field, for example:

name = Elizabeth.   Applicants use BitSets to store associations.

For example "parent", "child"; "is_married"; "likes"; "wears"; are entities that have nothing to do with the data values. In Applicants disclosure these BitSets refer to multiple keys within multiple tables that do not even share the same attributes or data values.

"submitting a query for desired information so that said database performs evaluation of said query using said Bitsets (See paragraph [0040-00481]"

Vagnozzi mentions indexing all searchable data for particular data values and shows how these indexes can be used to process standard queries. Applicants do not create indexes. They have prepopulated BitSets for storing associations between records. Applicants disclose innovative mechanisms for using explicit BitSets that model associations.

"database generates a resultant set (See paragraph [0047-00491)* *"resultant set returned to a requestor* (See paragraph [0003], [0036-00381)"*

Vagnozzi shows with a vehicle example how to use these indexes with slices (coarse/fine keys) to process the records. Applicants show queries for Categorization [0066], retrieving entities associated with all levels with a single query [0074], using column functions for relationships [0057-0061] and Boolean Rule Evaluation [0076] using either iteration of recursive queries, confirmation of existence or count of entities in the relationship [0055].

"repeat any or all steps as needed (See paragraph [00182], [0292])"

Vagnozzi needs to rerun the query because of locking problems. Applicants rerun the query until the recursive associationship under considerations is exhausted.

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The Examiner contends with respect to claim 2 that Vagnozzi teaches
"the computer readable program code means in said article of manufacture further comprising computer readable program code means for causing a computer to effect an independent query to said database and said data base transforms said query to a bit set query (See paragraph [0048])"
Vagnozzi mentions using hierarchical structure with multiple keys and bit vectors during indexing using coarse and fine slices for each data value and gives a detailed explanation of using this index structure during query processing. For example: MAKE = CHEVROLET. Applicants transform the associations to BitSets that are not dependent of data values of attributes and have no need to use any hierarchical structure or creating any indexes. Applicants'queries are not attribute data dependent, instead are only dependent on the associations modeled with BitSets

For claim 3, Vagnozzi teaches "the computer readable program code means in said article of manufacture further comprising computer readable program code means for causing a computer to effect the use of BitSets, said BitSets being selected from thegroup consisting of User Defined Type BitSets and fast User defined (See paragraph [0005-00061, [0048], [0139], [0185], [0285Vagnozzi mentions the boolean operations (AND BV, OR BV, ...) are for processing queries like MODEL=CHEVROLET and YEAR=1975 that are data dependent. Applicants use (BSAnd, BSOr) queries for processing BitSets of different types of associations. For example The BitSets of association of COLOR that a Person LIKES and WEARS [0057-0062]. Additionally, Applicants show use of BSANDEQUALS, BSANDISEMPTY for rule evaluation where the BitSets model the associations of evaluated Boolean expressions. Additionally, Vagnozzi uses additional numerous operations for managing Slices. Applicants have no such requirement.

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For claim 4, Vagnozzi teaches *"the computer readable program code means in said article of manufacture further comprising computer readable program code means for causing a computer to effect, if the relationship in said database comprises one or more levels of inheritance relationships, the aggregation of inheritance bitsets through forward and/or backward propagation* (See paragraph [0005-00061)."

Vagnozzi does not mention propogation of associations. Applicants disclose the use of BitSets to model Categorization. Collection of entities assocated with (For example - applicable documents for) parent and child categories are all relevant
to the category under consideration. Applicants disclose the query using BitSets to
retreive all these associations using recursive queries

For claim 5, Vagnozzi allegedly teaches *"the computer readable program code means in said article of manufacture further comprising
computer readable program code means for causing a computer to effect, if the
relationship in said database comprises one or more levels of boolean expression
relationships, the generation of boolean expression bitsets through forward and/or
backward propagation* (See paragraph [0004], [0008], [0047],[0149]).

Vagnozzi does mentions Boolean expressions (AND, OR, NOT) for queries in [0004], [0047]. Applicants do not claim this. This is present in any database. Vagnozzi mentions the find operations (FINDEQUAL_BV, FINDNEXT_BV, ...) are for processing queries that are used for searching through an index for specified keys or key ranges for particular Slices and data values. Applicants do not search for key ranges and are not dependent on data values. Applicants provide functions for BSANDEQUALS, BSANDISEMPTY, BSEQUALS
to compare BitSets of associations [0057-0062]. Vagnozzi mentions use of Bit Vectors to evaluate boolean expressions for queries with multiple AND/OR/NOT as they are executed [0008]. Applicants do not claim this. This is prior art. What Applicants do claim is how to represent and evaluate complex boolean expressions in tables explicitly using BitSets. The boolean expressions are associated to lowest level values that may be true or false for each evaluation. Every time the query for rule evaluation is executed the Enum Values BitSet will be provided. Different Enum Value BitSets provided as input will result in a different result for the

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Rule Evaluation. (Emphasis Added)

As to claim 6, Vagnozzi allegedly teaches: "the computer readable program code means in said article of manufacture further comprising
computer readable program code means for causing a computer to effect the use
of fast User Defined Functions, said fast User Defined Functions being selected from the group
consisting of scalar functions and column functions (See paragraph [0059],[0193-0197],
[0238], [0269], [0310])"

Vagnozzi [0059] discusses the index structure for Attribute Vechicle Color for specific data value Blue. Applicants do not create indexes for specific data values, instead they prepopulate BitSets for associations; for example COLOR_LIKES, COLOR_WEARS wherein each bitset represents associations to multiple keys of specific color. Vagnozzi [0193-0197] discusses the reresentation of employees records with Attribute values. Vagnozzi [0238] discusses indexing and retrieving combinations of words on adjacent pages in a free flowing stream of text. These are irrelevant to Applicants' claims. Applicants use Scalar functions [0062] and Column functions [0057, 0060] on associations represented by BitSets. Vagnozzi [0269] discusses page index Bit Vectors produced by indexing for Attribute name value pairs. Applicants use BitSets for Associations, not for data values. Vagnozzi [0310] mentions using key/Bi Vector for Timestamp. This is irreelevant to Applicants' claims.

As to claim 7, Vagnozzi allegedly teaches: *"the computer readable program code means in said article of manufacture further comprising computer readable program code means for causing a computer to effect the use of scalar functions* (See paragraph [0310], [0445]).

Vagnozzi [0310] mentions using key/Bit Vector for Timestamp. This is irrelevant to Applicants' claims. Vagnozzi [0445] mentions the design of indexing process. This is irreelevant to Applicants' claims. Applicants use Scalar functions
[0062] on associations represented by BitSets

As to claim 8, Vagnozzi allegedly teaches: *"the computer readable program code means in said article of manufacture further comprising computer readable program code means for causing a*

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computer to effect the use of scalar functions said scalar functions selected from the group consisting of BSGetLength(BITSET), BSInitO, BSInit(BIGINT,BIGINT), BSSetBit(BitSet, BIGINT), BSClearBit(BitSet, BIGINT), BSGetBit(BIGINTBSAnd(BitSet,BitSet), BSOr(BitSet, BitSet), BSEquals(BitSet, BitSet), BSMinus(BitSetBitSet), BSAndEquals(BitSet, BitSet), BSAndIsEmpty(BitSet, BitSetBSGetBitAt(BitSet, BIGINT), BSGetUpperBound(BitSet), BSGetLowerBound(BitSet) (See paragraph [0005-0006].

In [0005-0006] Vagnozzi mentions indexing using keys based on data values. In [0010-0011] Vagnozzi associates data using an index structure for one or more data values for the attributes. When using hierarchical relatonships, in [0014] Vagnozzi mentions using indexes associated with different attributes and each index associating data values. Applicants use BitSets based on independent relationships, not data values. In Paragraph [0006] Vagnozzi mentions using Bitmaps or BitVectors to ientify records containing a particular item of data within a particular data field, for example name = Elizabeth. Applicants use BitSets to store associations. For example: "parent" "child" "is_married" "likes", "wears" that has nothing to do with the data values. In Applicants disclosure these BitSets can refer to multiple keys within multiple tables that do not even share the same attributes or data values.

Vagnozzi [0059] discusses the index structure for Attribute Vechicle Color for specific data value Blue. Applicants do not create indexes for specific data values, instead they prepopulate BitSets for associations; For example COLOR_LIKES, COLOR_WEARS, wherein each bitset represent associations to multiple keys of specific color.

Vagnozzi [0015-0038] discusses the structure of the coarse, fine links and in [0039-0061] discusses in detail the indexing structure which are irrelevant to the elements in Applicants' claims. The scalar functions described by Vagnozzi in [0039-0046] show use of indexes in standard queries that are dependent on data values. Applicantsuse Scalar functions from the group (BSGetLength(BITSET), BSInitO, BSInit(BIGINT,BIGINT),BSSetBit(BitSet,

BIGINT), BSClearBit(BitSet, BIGINT), BSGetBit(BIGINT),BSAnd(BitSet,BitSet), BSOr(BitSet, BitSet), BSEquals(BitSet, BitSet), BSMinus(BitSet,BitSet), BSAndEquals(BitSet, BitSet), BSAndIsEmpty(BitSet, BitSet), BSGetBitAt(BitSet, BIGINT), BS GetUpperBound(BitSet), BS GetLowerBound(BitSet)) to query associations that are not

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dependent on data values. Applicants use BSGetLength - for confirmation of existence or count of entities in the relationship [0055] as illustrated with the association – is_married_to–. Use of remaining functions is illustrated in Boolean Rule Evaluation [[0076] and Categorization for computation of Applicability [0066].

As to claim 9, Vagnozzi allegedly teaches: *"the computer readable program code means in said article of manufacture further comprising computer readable program code means causing a computer to effect the use of column function* (See paragraph [0059], [0193], [0197]"

Vagnozzi [0059] discusses the index structure for Attribute Vehicle Color for specific data value Blue. Applicants do not create indexes for specific data values, instead they prepopulate BitSets for associations For example COLOR_LIKES, COLOR_WEARS wherein each bitset represent associations to multiple keys of specific color. In [0193] and [0197] Vagnozzi discusses specific issues with his indexes. He does not discuss or use column functions. Applicants do not have any of these issues with their use of BitSets. "Column Functions" compute, from a group of rows, a single value for a designated column or expression. This provides the capability to aggregate data, thereby enabling calculations across many rows with one SQL statement. Applicants disclose Column functions for aggregating BitSet results over multiple rows. For example BSCAND [0057] and BSCOR [0059] for the Person-Color example.

With respect to claims 10-18, 19 - 27, and 28 - 36, these claims are rejected on the identical grounds set forth in Claims 1 - 9. The corresponding arguments given hereinabove for rejected claims 1-9 are incorporated by reference herein with the same explanations given as those set forth in response to each of the rejections of Claims 1 - 9.

The arguments and discussions of the Vagnozzi teachings presented by Applicants in this amendment have pointed out that each and every element of Applicants' claims have not been disclosed in Vagnozzi. Accordingly the rejections of the claims under 35 USC 102(e) are not appropriate.

Applicants have attempted in this response to include language limitations to specifically define the invention and to clear up any ambiguities that may have existed in the wording heretofore.
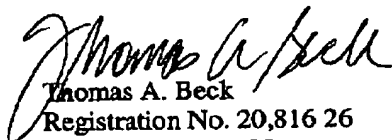
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The basis for the additions to the claims is found in the specification, drawings and claims as filed.

Applicants believe that the amended claims are in a form which should result in their allowability. If there are additions which could result in the claims being allowed, Applicants' attorney would be pleased to speak with the Examiner by phone concerning such action at a mutually agreeable time and will cooperate in any way possible.

Please address future correspondence in this matter to the undersigned at 15 Alameda Place, Mount Vernon, NY 10552.

Please extend for one month the time within which to respond to the Official Action noted above. Please charge the $120.00 one month extension fee to Deposit Account 02-1651.

Respectfully Submitted,

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354-0892

I hereby certify that this amendment response is being telefaxed to (571) 273-8300 on the date indicated below addressed to Commissioner of Patents & Trademarks, Post Office Box 1450, Alexandria, VA 22313-1450

Signature:
Name: Thomas A. Beck   Date: March 17, 2007

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